

## Section V. LAUNCHER AND LAUNCHING-HANDLING RAIL CHECKS AND ADJUSTMENTS

### 18. Wedgelock Limit Switch Checks and Adjustments

#### NOTE

Check that the hydraulic oil reservoir level indicates above the half-way mark on the sight gage. If the oil level is below the half-way mark, service the reservoir in accordance with the instruction plate on the launcher.

a. Position all switches at the section control-indicator panel and launcher control-indicator to the initial operating condition as prescribed in TM 9-1440-250-10/1. At the launcher, insure that the SYSTEM BYPASS valve (fig. 21) and the EQUILIBRATOR SYSTEM BYPASS valve are closed.

b. Set the TEST-FIRE switch on the launcher control-indicator to TEST, and the LAUNCHER DC POWER switch to ON.

#### CAUTION

If the erecting beam does not elevate, do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

#### NOTE

Use of a launching-handling rail for raising or lowering the erecting beam to perform maintenance is optional. If it is preferred not to use a rail, the two AJAX indexing pins must be depressed as a substitute for a rail.

c. Set the LAUNCHER switch to UP. If the launcher erecting beam unlocks and elevates, proceed to d below. If the beam does not elevate, but the hydraulic pumping unit motor does operate, set the LAUNCHER switch to STOP, and perform the operations prescribed in steps (1) through (5) below:

(1) Set the MAIN POWER switch in the power distribution box to OFF.

#### NOTE

The key numbers shown in parentheses in (2) and (3) below refer to figure 14 unless otherwise indicated.

(2) Remove the front, bottom, and side covers (3, 6, and 9) from the forward end of the launcher erecting beam (20).

(3) Lift the lever arm (12, fig. 17) of switch S50A (7, fig. 17) from the adjustable cam (10, fig. 17) on the forward locking wedge (16), and listen for a click. If a click is not heard, proceed to step (4) below. If a click is heard, perform the operations prescribed in (a) through (u) below.

(a) Determine how far the adjustable cam (10, fig. 17) has to be moved to obtain a click from switch S50A (7, fig. 17).

(b) Set the MAIN POWER switch in the power distribution box to ON. Set the LAUNCHER switch to DOWN.

(c) Set the MAIN POWER switch in the power distribution box to OFF.

#### NOTE

Perform (d) through (o) below only on launchers 1637 and subsequent.

(d) Open the SYSTEM BYPASS valve (fig. 21) and the EQUILIBRATOR SYSTEM BYPASS valve.

(e) Set the AIR-N-VENT valve (fig. 22) to VENT, and allow the hydraulic oil reservoir (fig. 22) to depressurize.

(f) Remove the caps from the bleeder valves (fig. 15).

(g) Connect a hose assembly to each bleeder valve. Place the opposite end of the hose assemblies into a suitable container.

(h) Open the bleeder valves.

(i) Position the forward locking wedge (16) to a position that properly aligns the set-screw (10) with the hole in the base assembly (21).

- (j) Tighten the bleeder valves (fig. 15).
- (k) Remove the hose assemblies from each bleeder valve.
- (l) Install the caps.
- (m) Close the SYSTEM BYPASS valve (fig. 21) and the EQUILIBRATOR SYSTEM BYPASS valve.
- (n) Pressurize the hydraulic oil reservoir as prescribed in 1 and 2 below.
  - 1 Open the access door.
  - 2 Set the AIR-N-VENT valve (fig. 22) to AIR, and pressurize the hy-

draulic oil reservoir to 18 to 25 psi, as indicated on the HYDRAULIC RESERVOIR PRESSURE gage.

- (o) Tighten the setscrew (10) so that the shaft (11) cannot rotate.
- (p) Remove one of the flathead screws (12), and replace it with a hexagon-head bolt (13) approximately 3 inches long. Use the bolt as a handle to lower and raise the locking wedge adjuster (17) when removing and



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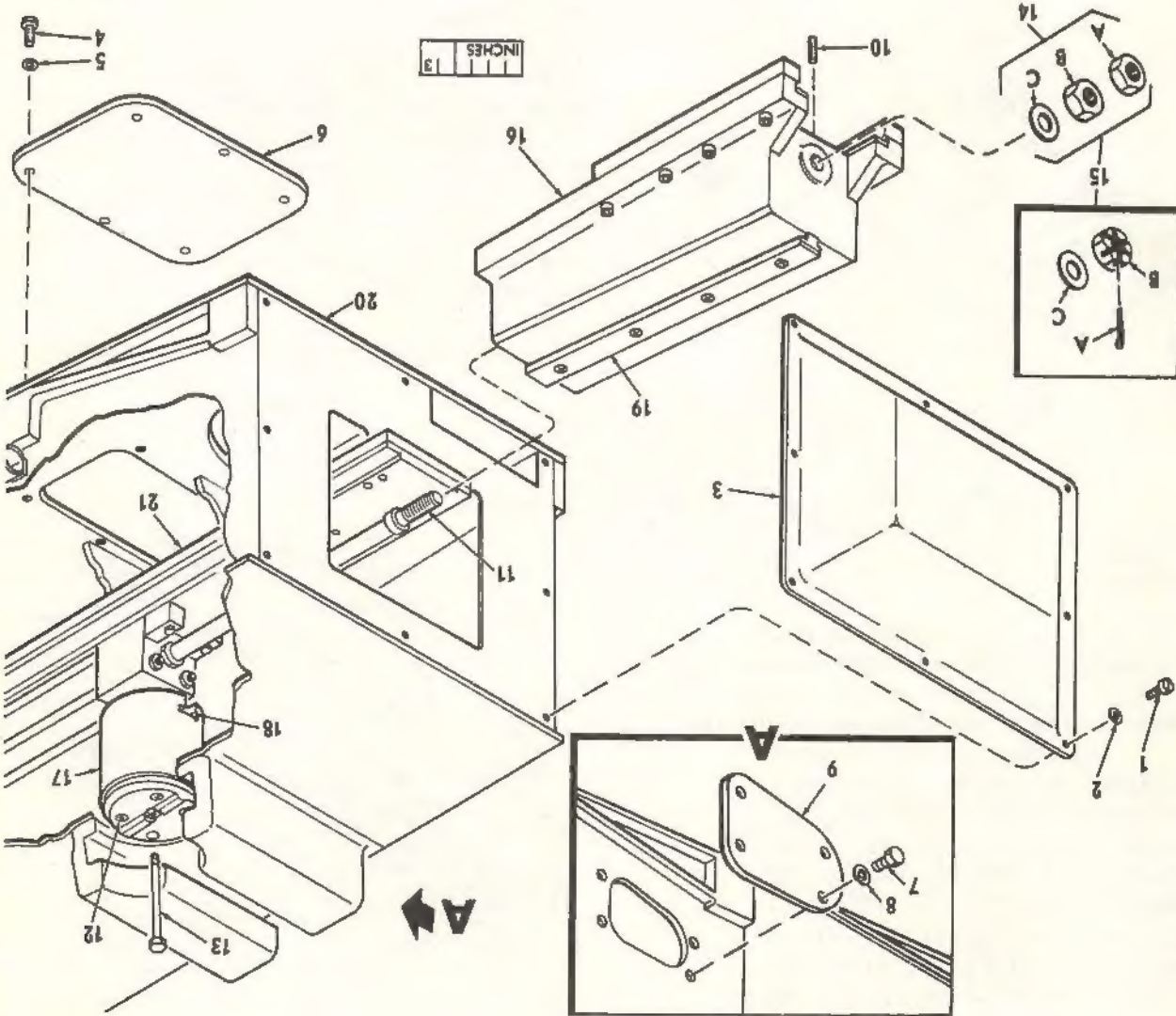
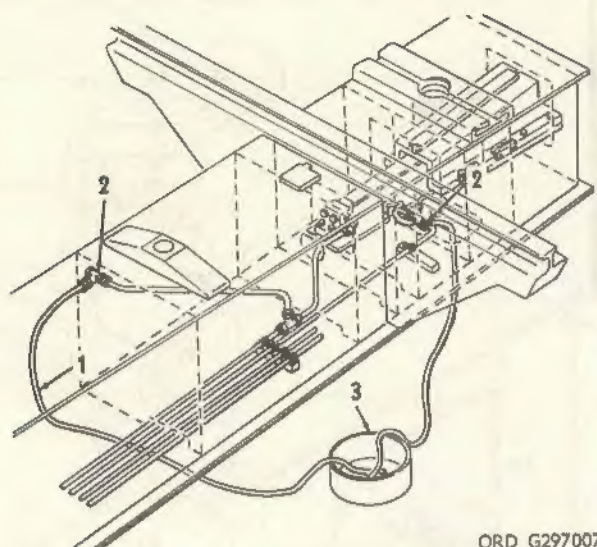


Figure 14. Forward locking wedge group—removal and installation.

installing the forward locking wedge (16).  
(q) Remove the nut and washer group (14 or 15) from the shaft. On launchers 1637 and subsequent

loosen the setscrew. Remove the forward locking wedge (16) from the shaft.  
(r) Loosen two socket-head screws (11, fig. 17) and position the adjustable





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- 1—Hose assembly (2)
- 2—Bleeder valve
- 3—Container

Figure 15. Locking wedge group bleed points.

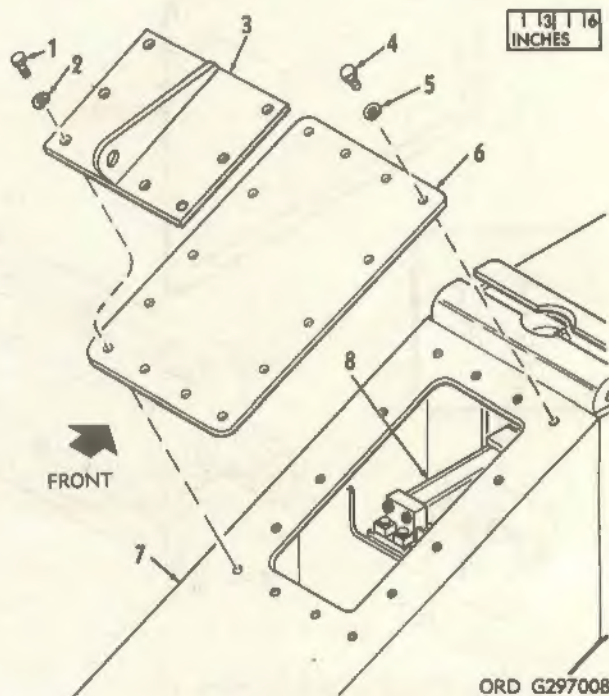
cam (10, fig. 17) as determined in (a) above; tighten the two socket-head screws.

- (s) Replace the forward locking wedge (16) by carefully sliding it onto the shaft (11) until it is stopped by the locking wedge adjuster (17). Aline the key slot (18) on the locking wedge adjuster with the key track (19) on the forward locking wedge and slide the forward locking wedge fully in. On launchers 1637 and subsequent rotate the shaft so that the flat surface of the shaft will receive the setscrew (10) to secure the forward locking wedge and tighten the setscrew. Install the nut and washer group (14 or 15) on the shaft. On launchers 1637 and subsequent loosen the setscrew.
- (t) Remove the hexagon-head bolt (13) and replace the flat-head screw (12).

**Caution:** If the erecting beam does not elevate, do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

- (u) Set the MAIN POWER switch in the power distribution box to ON. Set the LAUNCHER switch to UP. If the launcher erecting beam does not elevate, set the LAUNCHER switch to STOP and the MAIN POWER switch in the power distribution box to OFF and perform steps (4) and (5) below.

- (4) On mobile launchers, remove the plate (3, fig. 16).
- (5) Remove the rear wedgelock assembly access cover (6).



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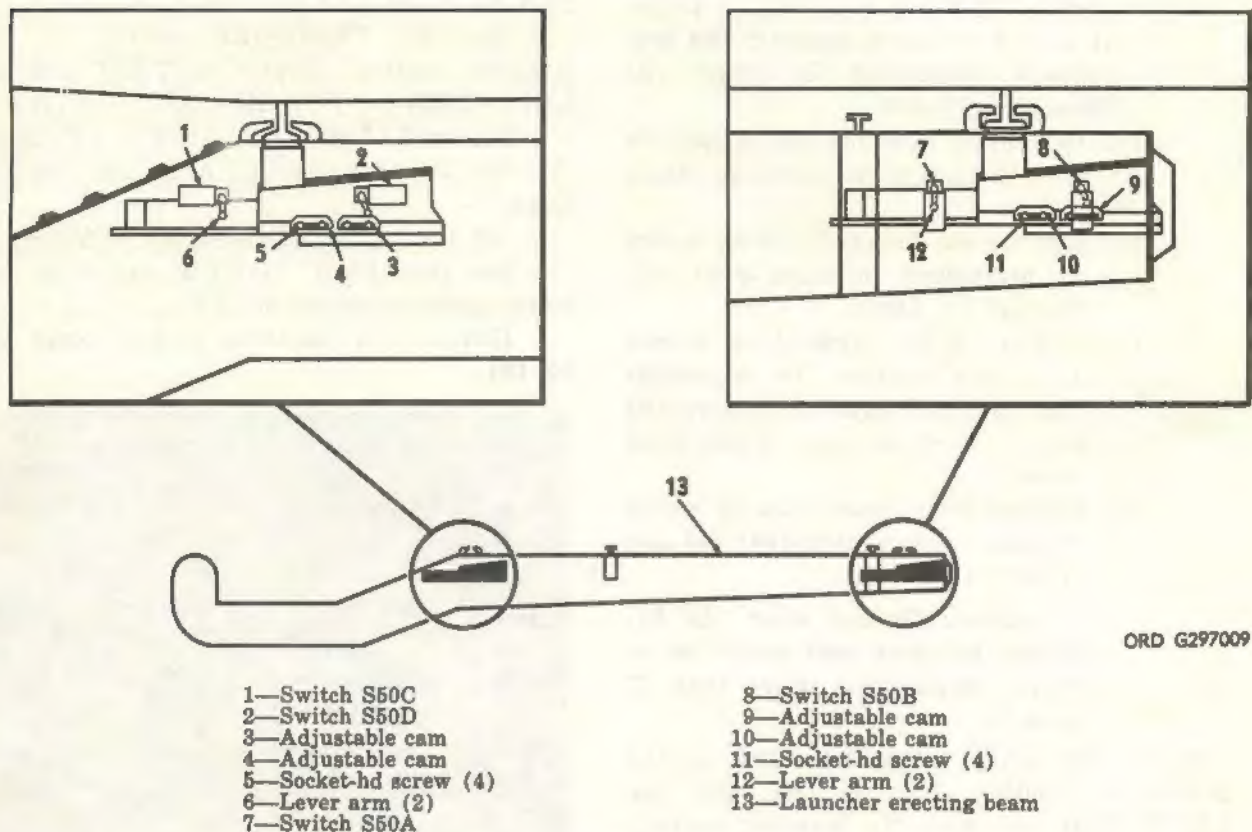
- 1—5/16-24 x 1-3/32 hex-hd bolt (8) (mobile launchers)
- 2—5/16-in. lockwasher (8) (mobile launchers)
- 3—Plate (mobile launchers)
- 4—5/16-24 x 7/8 hex-hd bolt (6) (mobile launchers) or (14) (permanent launchers)
- 5—5/16-in. lockwasher (6) (mobile launchers) or (14) (permanent launchers)
- 6—Rear wedgelock assembly access cover
- 7—Launcher erecting beam
- 8—Rear wedgelock assembly

Figure 16. Rear wedgelock assembly access cover—removal and installation.

**Note.** The key numbers shown in parentheses in (6) below refer to figure 17 unless otherwise indicated.

- (6) Lift the lever arm (6) of switch S50C (1) from the adjustable cam (4) and





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Figure 17. Forward and rear wedgelock limit switches—adjustments.

listen for a click. If a click is heard, perform the procedures prescribed in (a) and (b) below.

- (a) Loosen the two socket-head screws (5) and move the adjustable cam (4) until a click is heard on switch S50C (1). Tighten the two socket-head screws.

**Caution:** If the erecting beam does not elevate, do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

- (b) Set the MAIN POWER switch on the power distribution box to ON and the LAUNCHER switch on the launcher control-indicator to UP. Insure that the launcher erecting beam elevates. If the launcher erecting beam does not elevate, repeat steps (3) and (6) above.

d. Set the LAUNCHER switch on the launcher control-indicator to DOWN. Insure

that the launcher erecting beam lowers and locks and that the hydraulic pumping unit motor deenergizes. If the motor does not deenergize, perform the procedures prescribed in steps (1) through (8) below.

- (1) Set the MAIN POWER switch on the power distribution box to OFF.

*Note.* The key numbers shown in parentheses in (2) and (8) below refer to figure 17.

- (2) Lift the lever arm of switch S50D (2) from the adjustable cam (3) and listen for a click. If a click is not heard, proceed to step (3) below. If a click is heard, loosen the two socket-head screws (5) and move the adjustable cam until a click is heard. Tighten the two socket-head screws.
- (3) At the forward end of the launcher erecting beam (13), lift the lever arm (12) of switch S50B (8) from the adjustable cam (9) on the forward locking wedge and listen for a click. If a



click is not heard, proceed to *e* below. If a click is heard, perform the procedures prescribed in steps (a) through (d) below.

- (a) Determine how far the adjustable cam (9) has to be moved to obtain a click.
- (b) Remove the forward locking wedge as prescribed in steps c(3) (d) through (q) above.
- (c) Loosen the two socket-head screws (11) and position the adjustable cam (9) as determined in step (a) above. Tighten the socket-head screws.
- (d) Replace the forward locking wedge as prescribed in steps c(3) (s) and (t) above.

**Caution:** Do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

*e.* Set the MAIN POWER switch in the power distribution box to ON. Set the LAUNCHER switch on the launcher control-indicator to UP. Insure that the launcher erecting beam elevates. Set the LAUNCHER switch to DOWN and insure that the hydraulic pumping unit motor deenergizes after the erecting beam reaches the down and locked position. If the motor does not deenergize, set the LAUNCHER switch to STOP and repeat steps d(1) through (3) above.

*f.* Replace the rear wedgelock assembly access cover (6, fig. 16) at the rear of the launcher erecting beam and secure.

*g.* On mobile launchers, replace the plate (3) and secure.

*h.* Replace the front, bottom, and side covers (3, 6, and 9, fig. 14) at the forward end of the launcher erecting beam and secure.

## 19. Downlock Limit Switch Checks and Adjustments

**Note.** Insure that the launcher is level and that the hydraulic system has been bled before proceeding with the downlock limit switch checks and adjustments.

*a.* Position all switches at the section control-indicator and launcher control-indicator to the initial operating condition as prescribed in TM 9-1440-250-10/1. Insure that the SYSTEM BY-PASS valve (fig. 21) and the EQUILIBRA-

TOR SYSTEM BYPASS valve are closed.

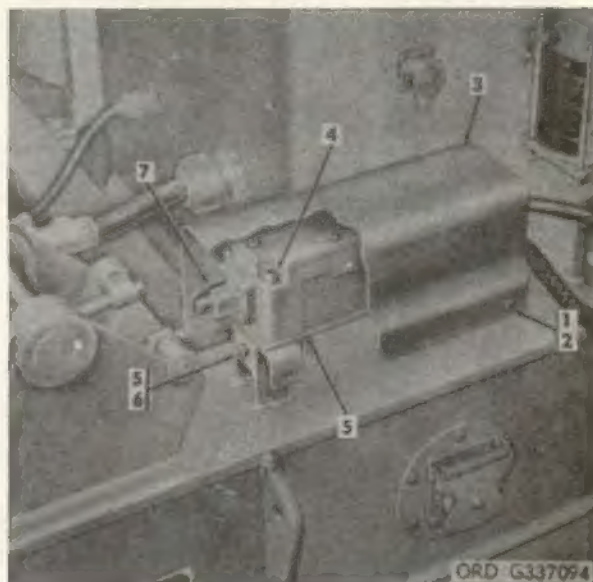
*b.* Set the TEST-FIRE switch on the launcher control-indicator to TEST and the LAUNCHER DC POWER switch to on (up).

*c.* Set the LAUNCHER switch to UP. Check that the launcher erecting beam elevates and locks.

*d.* Set the LAUNCHER switch to STOP.

*e.* Set the MAIN POWER switch in the power distribution box to OFF.

*f.* Remove the electrical switch cover (3, fig. 18).



- 1—1/4-20 x 1/2 hex-hd bolt (4)
- 2—1/4-in-id lockwasher (4)
- 3—Electrical switch cover
- 4—3/8-16 x 3 socket-hd screw (4)
- 5—Locknut
- 6—Setscrew
- 7—Downlock limit switch

Figure 18. Downlock limit switch—adjustment.

*g.* Loosen the four socket-head screws (4).

*h.* Loosen the locknuts (5) and turn the setscrew (6) counterclockwise to move the downlock limit switch (7) away from the limit switch trip plate.

*i.* Set the MAIN POWER switch to ON.

*j.* Set the LAUNCHER switch to DOWN. Insure that the launcher erecting beam lowers and locks.

*k.* Turn the setscrew clockwise until the hydraulic pumping unit motor deenergizes.

*l.* Continue turning the setscrew clockwise approximately one full turn beyond the point where the motor deenergizes; tighten the locknuts.



m. Tighten the four socket-head screws (4).  
 n. Install the electrical switch cover (8).  
 o. Set the LAUNCHER switch to UP. Insure that the launcher erecting beam elevates and locks.

p. Set the LAUNCHER switch to DOWN. Insure that the launcher erecting beam lowers and locks, and that the downlock limit switch does not deenergize the hydraulic pumping unit motor until the downlock assembly is fully engaged.

q. If the pumping unit motor does deenergize before the downlock assembly is fully engaged, repeat c through p above.

## 20. Uplock Limit Switch Checks and Adjustments

*Note.* Check that the hydraulic oil reservoir level indicates above the half-way mark on the sight gage. If the oil level is below the half-way mark, service the reservoir in accordance with the instruction plate on the launcher.

a. Position all switches at the section control-indicator and launcher control-indicator to the initial operating condition as prescribed in TM 9-1440-250-10. Insure that the SYSTEM BYPASS valve (fig. 21) and the EQUILIBRATOR SYSTEM BYPASS valve are closed.

b. Set the TEST-FIRE switch on the launcher control-indicator to TEST and the LAUNCHER DC POWER switch to on.

c. Set the LAUNCHER switch to UP.

d. Insure that the launcher erecting beam elevates and locks, and that the hydraulic pumping unit motor deenergizes.

**Caution:** Do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

e. If the hydraulic pumping unit motor does not deenergize, set the LAUNCHER switch to STOP.

f. Set the MAIN POWER switch in the power distribution box to OFF.

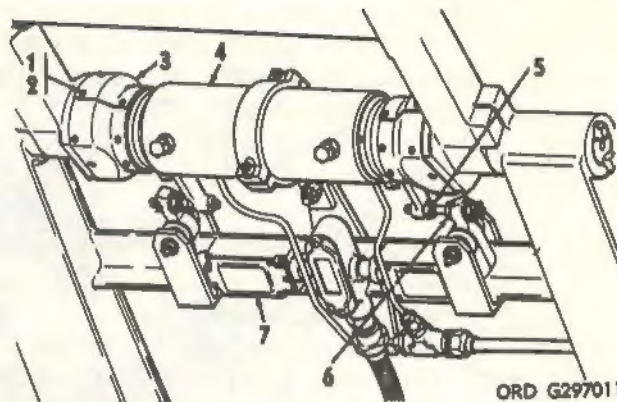
*Note.* The key numbers shown in parentheses in g through j below refer to figure 19.

g. Remove one strut cover plate (3).

h. Insure that the hydraulic uplock assembly (4) is extended and securely seated.

i. Replace the strut cover plate.

j. On one side of the uplock assembly loosen the locknut (5) and turn the adjusting stud (6)



- 1—No. 10/32 x 5/16 rd-hd screw (9)
- 2—No. 10 lockwasher (9)
- 3—Strut cover plate (2)
- 4—Hydraulic uplock assembly
- 5—Locknut (2)
- 6—Adjusting stud (2)
- 7—Switch (2)

Figure 19. Uplock limit switches—adjustments.

until the plunger of the switch (7) is fully extended; turn the stud in the opposite direction, compressing the plunger until a click is heard. Continue turning the stud an additional one-quarter turn; tighten the locknut.

k. Repeat g through j above on the opposite side of the uplock assembly.

l. Set the MAIN POWER switch in the power distribution box to ON.

m. Set the LAUNCHER switch on the launcher control-indicator to UP.

n. Insure that the hydraulic pumping unit motor is deenergized.

o. Set the LAUNCHER switch to DOWN. After the erecting beam is down and locked, set the switch to UP.

**Caution:** Do not allow the hydraulic pumping unit motor to remain energized for more than 30 seconds.

p. Insure that the erecting beam elevates and locks and the hydraulic pumping unit motor deenergizes.

q. If the motor does not deenergize, repeat e through p above.

## 21. Launcher Hydraulic Oil Drain and Flush Procedures

*Note.* The drain and flush procedures are to be performed when changing the hydraulic oil or when the oil becomes contaminated.



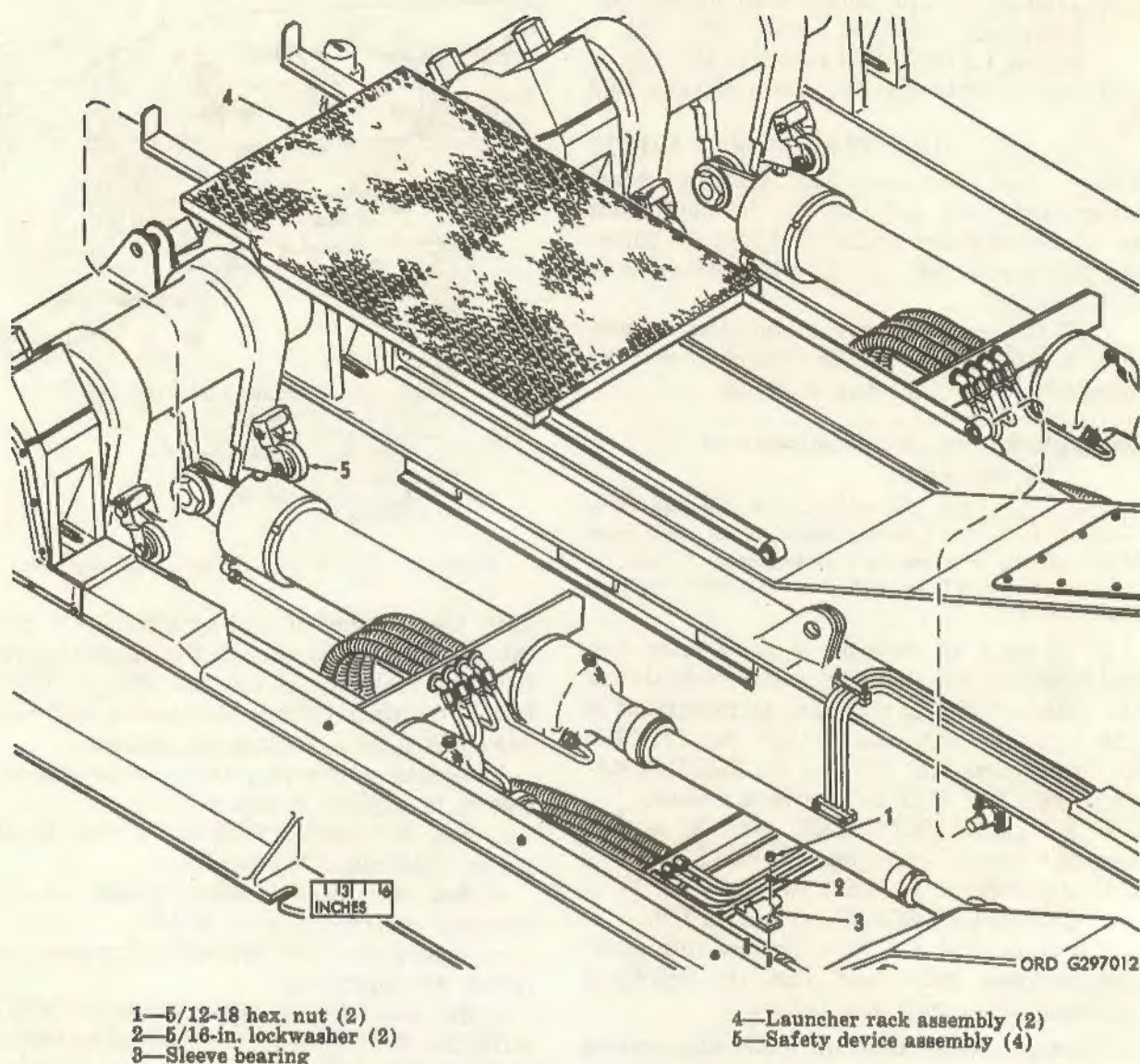


Figure 20. Launcher rack assemblies—removal and installation.

a. Remove the launcher rack assemblies (fig. 20).

**Caution:** The safety device assemblies must be secured in the vertical position to prevent them from being damaged when the launcher erecting beam is raised and lowered.

b. Secure the safety device assemblies.

c. Open the EQUILIBRATOR SYSTEM BYPASS valve (fig. 21).

d. Set the AIR-N-VENT valve (fig. 22) to VENT and allow the hydraulic oil reservoir to depressurize.

e. Open the SYSTEM BYPASS valve (fig. 21).

f. Remove the drain line cap (fig. 22) and allow the hydraulic oil to drain into a suitable container.

g. Slowly pressurize the hydraulic reservoir to maintain a steady flow of oil.

h. Connect an adapter (2, fig. 28) and quick-disconnect coupling half (1) to one end of the hose assembly (3) and connect an adapter (4) and quick-disconnect coupling (5) to the other end of the hose assembly.



i. Attach the hose assembly to the pressure and return fitting (6) on the forward end of the erecting beam.

j. Close the SYSTEM BYPASS valve (fig. 21).

k. Set the POWER switch on the section control-indicator to ON.

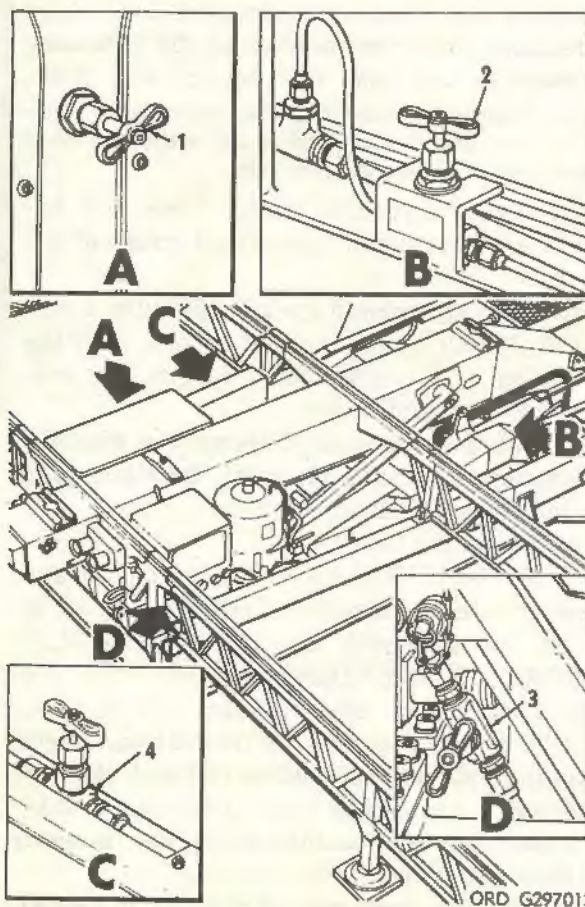
l. Set the MAIN POWER BRKR switch on the power distribution box to ON.

m. Set the LAUNCHER DC POWER switch on the launcher control-indicator to on.

n. Set the TEST-FIRE switch on the launcher control-indicator to TEST.

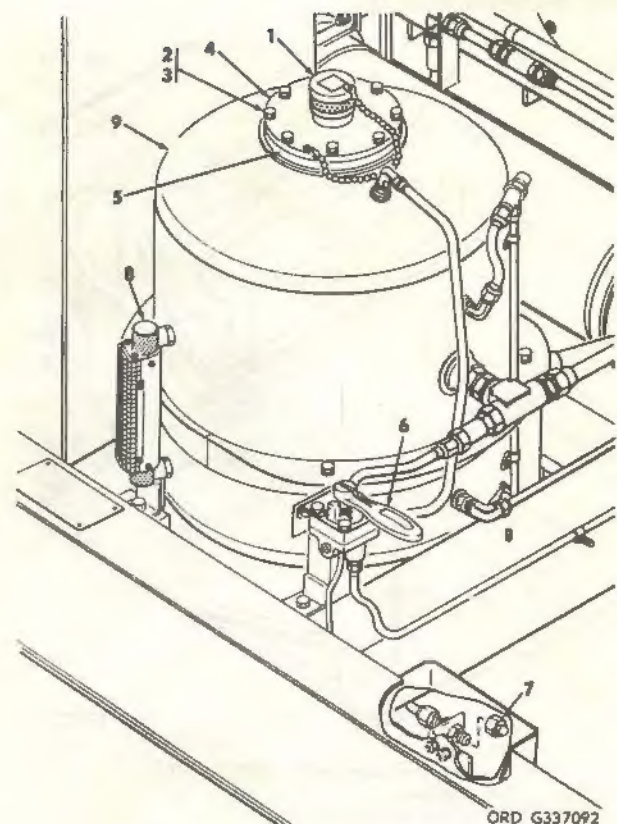
**Caution:** Do not allow the hydraulic pumping unit to remain energized for more than 30 seconds.

o. Set the MISSILE HYD switch on the launcher control-indicator to ON.



- 1—SYSTEM BYPASS valve
- 2—EQUILIBRATOR SYSTEM BYPASS valve
- 3—Missile hydraulic shutoff valve
- 4—Missile hydraulic globe valve

Figure 21. Launcher hydraulic valves.



- 1—Filler cap
- 2—1/4-28 x 2-5/8 hex-hd capscrew (8)
- 3—1/4-in-id lk washer (8)
- 4—Reservoir cover
- 5—Gasket
- 6—AIR-N-VENT valve
- 7—Drain line cap
- 8—Sight gage
- 9—Hydraulic oil reservoir

Figure 22. Hydraulic oil reservoir.

p. Open the missile hydraulic globe valve and allow the hydraulic oil in the missile hydraulic system to drain into the hydraulic oil reservoir.

q. Set the MISSILE HYD switch to OFF.

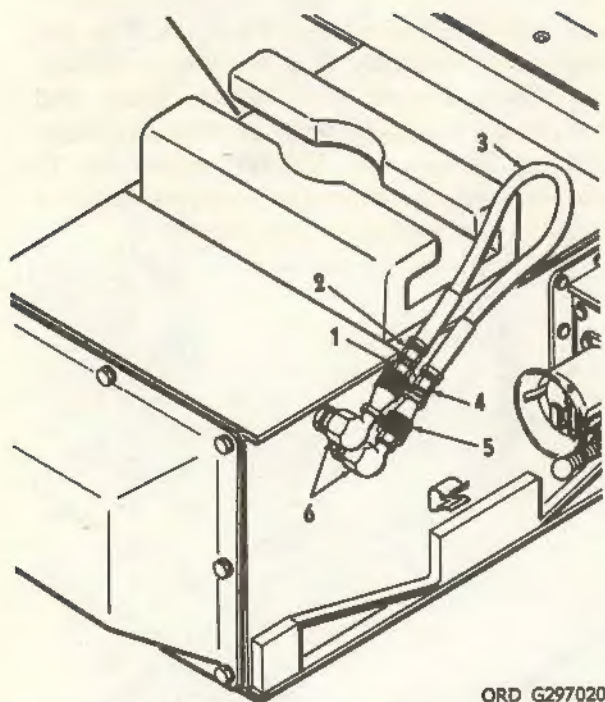
r. When all the oil has drained from the reservoir, install the drain line cap (7, fig. 22) and torque it to 270  $\pm$  25 pound-inches.

s. Pressurize the hydraulic oil reservoir (9) as prescribed in steps (1) and (2) below.

(1) Open the access door.

(2) Set the AIR-N-VENT valve (6) to AIR and pressurize the hydraulic oil reservoir to 18 to 25 psi as indicated on the HYDRAULIC RESERVOIR PRESSURE gage.





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- 1—Quick-disconnect coupling half
- 2—Adapter
- 3—Hose assembly
- 4—Adapter
- 5—Quick-disconnect coupling
- 6—Pressure and return fittings

Figure 23. Launcher missile hydraulic lines—flush.

t. (deleted).

u. Remove the set screws (6 and 3) and install an adapter and a hose assembly (4) on the bleeder valves (7 and 5) on the forward end of the left and right equilibrator cylinder assemblies (8 and 9). Place the free end of each hose assembly in a suitable container (10).

v. Loosen the bleeder valve (7) on the left equilibrator cylinder assembly and allow the hydraulic oil to flow until air is escaping from the hose assembly; tighten the bleeder valve.

w. Repeat v above for the right equilibrator cylinder assembly.

x. Remove the hose assemblies from the left and right equilibrator cylinder assemblies.

y. Install a hose assembly on each bleeder valve (11 and 12) on the rear end of the left and right equilibrator cylinder assemblies.

Place the free end of each hose assembly in a suitable container.

z. Pressurize the hydraulic oil reservoir.

aa. Loosen each bleeder valve (11 and 12) and allow the hydraulic oil to flow until the flow stops and air is escaping from the hose assemblies; tighten the bleeder valves.

ab. Remove the hose assemblies.

ac. Repeat y through aa above for each bleeder valve (13 and 14) on the rear end of the left and right actuating cylinder assemblies (15 and 16).

ad. Replace the filter elements in the hydraulic pumping unit as prescribed in paragraph 49.

ae. Depressurize the hydraulic oil reservoir as prescribed in d above.

af. Remove the filler cap (1, fig. 22).

af.1. Remove the capscrews and lockwashers (2 and 3) and remove the reservoir cover (4); thoroughly clean the interior of the hydraulic oil reservoir and flush with solvent and drain.

*Note.* Inspect the interior of the hydraulic oil reservoir for rust and corrosion; if found, notify the direct support unit to replace the reservoir.

af.2. Using hydraulic fluid, flush the hydraulic oil reservoir to remove all traces of the solvent.

af.3. Replace the old gasket (5) with a new gasket. Install the cover and secure with the capscrews and lockwashers; torque the capscrews to 35 pound-inches.

ag. Fill the hydraulic oil reservoir with the appropriate hydraulic oil until the sight gage (8) indicates FULL.

ah. Install the filler cap.

ai. Set the AIR-N-VENT valve to AIR and pressurize the hydraulic oil reservoir to 18 to 25 psi as indicated on the HYDRAULIC RESERVOIR PRESSURE gage.

aj. Loosen each bleeder valve (13 and 14, fig. 24) on the rear end of the left and right actuating cylinder assemblies (15 and 16) and allow the air to escape until air-free hydraulic oil flows; tighten the bleeder valves. Remove the hose assemblies.

ak. Install a hose assembly on each bleeder valve (11 and 12) on the rear end of the equilibrator cylinder assemblies (8 and 9). Place the free end of the hose assemblies in a suitable container.



*al.* Repeat *aj* above for the bleeder valves on the rear end of the equilibrator cylinder assemblies.

*am.* Install a hose assembly on each of the adapters in the bleeder valves (7 and 5) on the forward end of the left and right equi-

brator cylinder assemblies. Place the free end of each hose assembly in a suitable container.

*an.* Slowly loosen each bleeder valve and allow the air to escape until air-free hydraulic oil flows; torque the bleeder valves to 75 pound-inches and remove the adapters and hose assemblies and install the set screws.